the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970) (emphasis added). See MPEP § 2143.03.

Moreover, these are limitations of the claims that are not taught or suggested by Badano. The Examiner rejected claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,167,292 ("Badano"). Badano discloses a method and apparatus for registering patient space with image space for robotic surgery. In robotic surgery, preoperative images are initially taken of the area to be operated on. A surgeon examines the images, and plans a path for the robotic instrument to take during surgery. This path is programmed into the robot, which then performs the operation on the patient. To do so, however, the robot must orient itself to the patient – i.e., the robot's frame of reference (referred to as patient space) must be registered with the frame of reference of the preoperative image (image space).

Badano accomplishes this registration by first placing an insert securely into the patient (such as into his skull, as depicted in Figure 7). A first support element, supporting a plurality of markers, is affixed to the insert prior to obtaining the preoperative image. The markers are elements that will be visible in the image, and which type of marker is used depends on the imaging technology selected. After obtaining the preoperative image (with the markers visible in the image), the surgeon plans the procedure and programs the robot. The first support element (with the markers) is removed from the insert, and replaced with a second support element. The second support element has energy emitters or receivers (preferably ultrasonic microphones) in the same positions as the markers were previously located. The robot then moves into position to perform the surgery. Attached to the robot are energy receivers or emitters corresponding to those on the second support element (preferably ultrasonic emitters). The robotic system then uses the energy emitters/receivers to align – or register – itself to the orientation of the image. That is, the robot aligns it physical

orientation (patient space) to that of the image (image space). The robot then proceeds to perform the image space movements programmed into it.

The preoperative images – which form no part of the invention of Badano – are the only mention in Badano of any radiographic imager. Even these references are superficial, and appear only in the context of a broad survey of known preoperative imaging technologies. Bandano describes the options as "conventional radiological examinations, CT scanner examinations, magnetic resonance imaging (MRI), or positron emission tomography (PET) imaging." col. 1, lines 13-16, repeated at col. 1, lines 43-46. These preoperative imaging technologies are additionally listed, with no further explanation, at col. 8, line 12 and col. 8, lines 35-36. This mention in Bandano of radiographic imaging as one of may imaging techniques is completely void of any detail. Bandano does not disclose an x-ray source or an image receptor, does not suggest that the distance between the two is of any concern, and does not disclose any means of measuring or calculating that distance.

Bandano discloses the use of energy emitters and corresponding receptors to align a surgical robot in patient space with the image space in which its surgical procedure is programmed. Bandano does not disclose that the energy emitters/receptors are used to calculate distance per se, or that the distance between the two, if calculated, would have any utility at all to a radiographic image. In fact, such a suggestion is ludicrous, as Bandano clearly teaches that all imaging (whether by radiographic means or otherwise) is completed prior to the deployment of energy emitter/receptor pairs, which function only to register the robot to the image space.

Bandano does not even disclose that the distances are displayed. As far as Badano discloses, the distances measured between the ultrasonic emitters and microphones are only used for internal motion calculations for the robot, and image space transformations. See col. 8, line 55 – col. 9, line 15. They are not disclosed as

being displayed to a technician for any use, and certainly not to align an x-ray source with an image receptor in a radiographic imaging procedure, as explicitly recited in claims 1 and 8. "[T]he prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP § 2142.

In the last paragraph, the Examiner states "Badano discloses the claimed invention, a measuring device can determining [sic] the distance between any two selected points associated with the radiographic apparatus to ensure the proper relationship between the radiation source and the imaging subject," citing to col. 5, lines 5-37 for this proposition. This statement is incorrect for several reasons. First, measuring the distance between any two selected points is not the claimed invention – the explicitly recite measuring the distance between an x-ray source and an image receptor. Second, nothing in Bandano discloses ensuring the proper relationship between the radiation source and the imaging subject – the mechanics of taking a preoperative (radiographic) image form no part of Bandano's invention or disclosure. Third, the citation does not support the proposition – that portion of Bandano discloses the use of ultrasonic transducers to register a robotic surgical apparatus to an image space orientation.

Also in that paragraph, the Examiner stated, as a motivation to modify Bandano, that it would have been obvious to employ Bandano's teaching of measuring the travel time of ultrasonic energy to determine the distance between an x-ray source or a collimator and an image receptor "because it would allow the radiographic imager easily and accurately [to be] set [to a proper configuration] prior to each exposure to increase the quality of the resulting diagnostic image and ensure the proper relationship between the radiation beam energy and the imaging subject." Bandano does not teach determining the distance between an x-ray source or a collimator and an image receptor. Bandano does not teach that any distances in a radiographic imager should be set prior

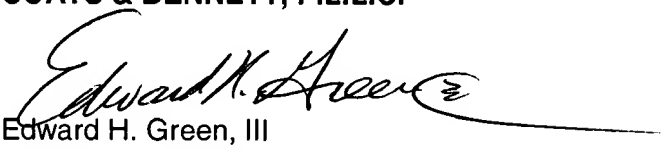
to each exposure. Bandano does not teach that doing so would increase the quality of the resulting diagnostic image. Bandano does not teach that doing so would ensure the proper relationship between the radiation beam energy and the imaging subject. In short, Bandano is void of any teaching or suggestion that the ultrasonic emitters/receivers used for registration of a robotic surgical system may have any utility in a radiographic imaging system. Nor has the Examiner articulated any such teaching in the art. Nor has the Examiner articulated any likelihood of success in applying a robotic surgery registration system to radiographic imaging. See MPEP § 2143.

Even assuming, arguendo, that sufficient motivation to modify Bandano exists, Bandano fails to teach every limitation of the claimed invention. Claims 1 and 8, for example, explicitly recite measuring the distance from an x-ray source to an image receptor – limitations on which Bandano is completely silent.

As all claims of the present invention are patentably non-obvious over Bandano, Applicant respectfully urges that the present application is in condition for allowance and requests prompt allowance of the same.

Respectfully submitted,

COATS & BENNETT, P.L.L.C.

By: 

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